ABSTRACT

This invention describes a method for increasing the speed of the parabolic marching method by about a factor of 256. This increase in speed can be used to accomplish a number of important objectives. Firstly, the speed can be used to collect data to form true 3-D images or 3-D assembled from 2-D slices. Speed allows larger images to be made. Secondly, the frequency of operation can be increased to 5 MHz to match the operating frequency of reflection tomography. This allow the improved imaging of speed of sound which in turn is used to correct errors in focusing delays in reflection tomography imaging. This allows reflection tomography to reach or closely approach its theoretical spatial resolution of 1/2 to 3/4 wave lengths. A third benefit of increasing the operating frequency of inverse scattering to *5* MHz is the improved out of topographic plane spatial resolution. This improves the ability to detect small lesions. It also allow the use of small transducers and narrower beams so that slices can be made closer to the chest wall.